

REMARKS

This paper is presented in response to the non-final official action dated August 3, 2010, wherein (a) claims 1-44 were pending, (b) claims 1-15, 39, and 40 were withdrawn from consideration, (c) claims 16-39 [sic – 16-38] and 41-44 were rejected for indefiniteness, (d) claims 16-21, 23-27, 29, 30, 32-36, 38, and 41-43 were rejected as being obvious over Nakata, Probst, and Levine, (e) claims 22 and 28 were rejected as being obvious over Nakata, Probst, Levine, and Yoshikawa, (f) claim 31 was rejected as being obvious over Nakata, Probst, Levine, and Hogel, and (g) claims 37 and 44 were rejected as being obvious over Nakata, Probst, Levine, and Tsuzuki.

By the foregoing, claims 16, 25, 26, 34, and 41-43 have been amended. Claims 16-38 and 41-44 remain at issue, with claim 16 being independent.

Reconsideration of the application, as amended, is solicited.

The issues raised in the official action are addressed below in the order in which they appear in the action.

Claim Rejections – 35 USC 112

The indefiniteness rejections of claims 16-38 and 41-44, as amended, are respectfully traversed; reconsideration is requested.

Antecedent basis for the row in line 23 of claim 16 appears in line 21 of claim 16, which recites “a row.”

Claims 16, 25, 26, 34, and 41-43 have been amended to address the bases for rejection of each of those claims, and reconsideration and withdrawal of the indefiniteness rejections thereof are therefore solicited.

Claim Rejections – 35 USC 103

All elected claims 16-38 and 41-44 stand rejected as being obvious over various combinations of reference, each combination relying on Nakata, Probst, and Levine. The rejections are respectfully traversed, and reconsideration is requested.

Nakata is relied upon for a disclosure of a semiconductor element with a CIS layer. However, the action recognizes that Nakata does not disclose a molybdenum back contact or a CdS buffer layer.

Probst teaches a conventional flat solar cell with a CIS layer, a glass substrate, and a molybdenum back contact.

Nakata and Probst are silent concerning the particulars of a spherical semiconductor arrangement and electrical connection on a larger scale.

Levine teaches a device comprising an insulating support layer and semiconductor elements protruding from the surface of the support layer, whereby a conductive metal foil embedded in the support layer contacts a front (N-Type regions) of spheres 53 and a back (P-type regions) of spheres 54 (see Fig. 5 and column 4, lines 44 to 46).

Levine does not disclose a front contact layer on one side of the support layer on which the elements protrude from the layer and a back contact layer on the side of the support layer that is opposite from the front contact layer as recited in claim 16.

Rather than two contact layers arranged on each side of the support layer with actual separation cuts as recited in claim 16, Levine discloses a conductive metal foil embedded in the support layer and bent so as to contact the front (N-Type regions) of the spheres 53 and the back (P-type regions) of the spheres 54 (see Fig. 5 and column 4, lines 44 to 46). The same metal foil thereby serves as front contact for the spheres 53 and as back contact for the spheres 54.

Thus, Levine neither discloses nor requires two distinct contact layers or separation cuts, as recited in the claims at issue.

The use of two distinct contact layers (front and back) arranged on both sides of the support layer together with separation cuts according to the invention is much easier than the use of metal foils.

If metal foils are used and a connection as described in Levine Fig. 5 is contemplated, several different foils must be used for the connection as shown in Fig. 5 (which shows at least three foils). Each of these foils has to be manipulated, properly embedded, and bent in an appropriate way. This may be cumbersome and even may be a source of defects.

On the other hand, the invention relies only on continuous contact layers with separation cuts made at appropriate places. This makes the design of the serial connection according to the invention very simple and very convenient for a continuous production. Moreover, it may reduce the risk of defects.

In addition, if metal foils are used for a connection as described in Levine Fig. 5, only the upper half of the spheres (53 and 54) may be irradiated by light because the metal foils (51) and their arrangement in the substrate prevent light to reach the lower half of the spheres (53,54).

On the other hand, the invention relies only on continuous contact layers with separation cuts made at appropriate places. This allows to use a transparent front contact layer, so that the spherical semiconductor elements of the invention may be completely irradiated by light (i.e., the whole sphere may be irradiated). This allows to increase the light efficiency of the solar cells using the serial connection according to the present invention.

None of the documents of the prior art neither alone nor in combination disclose or suggest the use of two distinct contact layers (front and back) arranged on both sides of the support layer together with separation cuts as recited in claim 16.

Even a combination of the documents of the prior art does not lead to the invention with all features recited in claim 16 and with all benefits coming from these features. The invention thus must be considered non-obvious compared to the prior art.

Care should thereby be taken to avoid impermissible hindsight reasoning based only on information gleaned from the present invention when evaluating obviousness. Rather, only the prior art should be considered when evaluating obviousness.

Doing so and starting only from the prior art, none of the documents of the prior suggest that serial connection with two distinct contact layers (front and back) arranged on both sides of the support layer together with separation cuts may be possible or desirable. There is thus absolutely no indication in the prior art leading to the invention.

Starting only from the prior art at the time of filing, it does therefore not appear how a skilled artisan would arrive at the idea for serial connection with two distinct contact layers (front and back) arranged on both sides of the support layer together and with appropriate separation cuts without gleaning information from the invention.

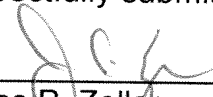
Conclusion

For all the foregoing reasons, all elected claims 16-38 and 41-44 are of proper form and scope for allowance, and such action is solicited.

Should the examiner wish to discuss the foregoing or any matter of form in an effort to advance this application toward allowance, she is urged to telephone the undersigned at the indicated number.

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Respectfully submitted,

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